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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/624,728
Filing Date: July 21, 2003
Appellant(s): WANG, ALBERT

Timothy J. Goodson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 22, 2007 appealing from the Office action mailed November 3, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on January 3, 2007 has been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner:

Claims 1, 3-12, 18-25 are directed to the same invention as that of claims 1-28 of commonly assigned USPat. US 6,273,956 B1, US 6,228,773 B1. The issue of priority under 35 U.S.C. 102(g) and possibly 35 U.S.C. 102(f) of this single invention must be resolved.

Claims 1, 3-12, 18-25 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. US 6,273,956 B1.

Claims 1, 3-12, 18-25 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. US 6,228,773 B1.

Claims 1, and 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara Yasumasa (JP08127861)[1] in view of Jansen; Frank (US 4,612,207 A).

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara Yasumasa (JP08127861)[2] in view of Jansen; Frank (US 4,612,207 A) and Cox; Gerald M. (US 6,228,773 B1).

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6802933 B2	Khan; Anisul et al.	10-2004
US 6228773 B1	Cox; Gerald M.	05-2001

(9) Grounds of Rejection

The following ground of rejection are applicable to the appealed claims:

Claims 12, and 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cox; Gerald M. (US 6,228,773 B1) in view of Khan; Anisul et al. (US 6,802,933 B2). Cox teaches a dual chamber processing system (Figures 4, 6, 15; See common numbers) for continuously processing a plurality of work pieces (31,33; Figure 15) comprising: a common power source (22; column 7, line 1 – column 8, line 20) switchable (22; column 7, line 1 – column 8, line 20) between a first plasma applicator (26; Figure 15) of a first chamber (30;

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[1] IDS reference of paper number 25042005. See provided machine translation from http://www4.ipdl.ncipi.go.jp/Tokujitu/PAJdetail.ipdl?N0000=60&N0120=01&N2001=2&N3001=H08-127861

Figure 15; column 8; lines 25-45) and a second plasma applicator (28; Figure 15) of a second chamber (32; Figure 15; column 8; lines 25-45), the first chamber (30; Figure 15; column 8; lines 25-45) for processing a second workpiece in a vacuum to completion therein, when the power source (22; column 7, line 1 – column 8, line 20) is applied thereto and switched ON.

Applicant's claim limitations of:

"a robot (15; column 8, lines 55-65; Figure 4,6,15) configured to remove at substantially atmospheric pressure a first workpiece from the second chamber (32; Figure 15; column 8; lines 25-45) after processing the first workpieces (31,33; Figure 15) the robot (15; column 8, lines 55-65; Figure 4,6,15) configured to reload the second chamber (32; Figure 15; column 8; lines 25-45) with a third workpiece to be processed while the second workpiece is being processed in the first chamber (30; Figure 15; column 8; lines 25-45), the robot (15; column 8, lines 55-65; Figure 4,6,15) configured to remove at substantially atmospheric pressure the second workpiece from the first chamber (30; Figure 15; column 8; lines 25-45) after processing the first workpiece, the robot (15; column 8, lines 55-65; Figure 4,6,15) configured to reload the first chamber (30; Figure 15; column 8; lines 25-45) with a fourth workpiece to be processed while the third workpiece is being processed in the second chamber (32; Figure 15; column 8; lines 25-45) the second chamber (32; Figure 15; column 8; lines 25-45) for processing the third workpiece in a vacuum to completion therein when the power source (22; column 7, line 1 – column 8, line 20) is applied to the second plasma applicator (28; Figure 15) and switched ON" are claim limitations of intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not

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[2] IDS reference of paper number 25042005. See provided machine translation from

limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Cox further teaches:

i. exactly one pump (34; Figure 15; column 5; lines 55-67) adapted to be in fluid communication with the first and second chambers (30, 32; Figure 15), the pump (34; Figure 15; column 5; lines 55-67) being configured to perform both process pumping and pump-down pumping of both chambers

ii. The system of Claim 12, wherein the single pump (34; Figure 15; column 5; lines 55-67) is a dry pump (34; Figure 15; column 5; lines 55-67), as claimed by claim 18

iii. The system of Claim 12, wherein the first chamber (30; Figure 15; column 8; lines 25-45) and the second chamber (32; Figure 15; column 8; lines 25-45) are adjacent to each other, as claimed by claim 21

iv. The system of Claim 12, wherein the power source (22; column 7, line 1 – column 8, line 20) is a microwave power source (22; column 7, line 1 – column 8, line 20), as claimed by claim 22

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http://www4.ipdl.ncipi.go.jp/Tokujitu/PAJdetail.ipdl?N0000=60&N0120=01&N2001=2&N3001=H08-127861

v. The system of Claim 12, wherein the chambers (30,32; Figure 15) are each configured to receive a single silicon wafer at a time, and the chambers (30,32; Figure 15) are each downstream of a plasma reactor (26; Figure 15), as claimed by claim 24

vi. The system of Claim 12, wherein the chambers (30,32; Figure 15) are each configured to receive a single silicon wafer at a time, and the chambers (30,32; Figure 15) each comprise an in situ plasma reactor (26; Figure 15), as claimed by claim 25

Cox does not teach

i. a computer configured to repeatedly synchronously and alternately control the power source (22; column 7, line 1 – column 8, line 20) application, the robot (15; column 8, lines 55-65; Figure 4,6,15) movement, the chamber processing, and the pump (34; Figure 15; column 5; lines 55-67), the computer configured to control the pump (34; Figure 15; column 5; lines 55-67) and the robot (15; column 8, lines 55-65; Figure 4,6,15) to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting the workpiece removal and workpiece reloading of the other of the chambers such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time, and the computer being configured to open the pump (34; Figure 15; column 5; lines 55-67) to fluid communication with only one of the chambers at a time, as claimed by claim 12.

ii. The system of Claim 12, wherein the system further comprises only one isolation valve (45, 38, 56; Figure 15) between the pump (34; Figure 15; column 5; lines 55-67) and the first chamber (30; Figure 15; column 8; lines 25-45), as claimed by claim 19

iii. The system of Claim 19, wherein the system further comprises only one isolation valve (58, 39, 47; Figure 15) between the pump (34; Figure 15; column 5; lines 55-67) and the second chamber (32; Figure 15; column 8; lines 25-45), as claimed by claim 20

iv. The system of Claim 12, wherein the power source (22; column 7, line 1 – column 8, line 20) is a common radio frequency power source (22; column 7, line 1 – column 8, line 20) synchronously multiplexed between the two processing chambers, as claimed by claim 23

Khan teaches a computer controller (500; Figures 2B, 3B, 4, 5A) for process control of plural chambers (200, 300, 409; Figure 5A), robot (412; Figure 5A), and power (415; Figure 5A).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Khan's computer controller method for automating Cox's above process components, and for Cox to use "only one isolation valve".

Motivation to add Khan's computer controller method for automating Cox's above process components, and for Cox to use "only one isolation valve" is for process automation as taught by Khan (column 25, line 48 – column 26, line 66) and for equipment economization. It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05). Further, it is established that the use of a one

piece construction instead of interconnected components is obvious (In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965), MPEP 2144.04).

(10) Response to Argument

Applicant states at page 12-13:

"

This rejection is improper for at least two reasons. First, Khan does not teach the "computer configured to" limitation. Khan's mere disclosure of a computer controller for a substrate processing system in no way suggests the "computer configured to" limitation of Claim 12, including (1) one chamber undergoing the steps of pump down and subsequent process pumping while another chamber simultaneously undergoes the steps of venting, workpiece removal, and workpiece reloading; and (2) the pump down pumping in one chamber beginning at substantially the same time has the venting in another chamber. The Cox patents also fail to disclose or suggest this limitation, for all the reasons discussed hereinabove at Subsection A.1.c. Thus, the Final Office Action does not point to any prior art that suggests these limitations.

"

In response to Applicant's position that Khan does not teach the "computer configured to" limitations of (1) one chamber undergoing the steps of pump down and subsequent process pumping while another chamber simultaneously undergoes the steps of venting, workpiece removal, and workpiece reloading; and (2) the pump down pumping in one chamber beginning at substantially the same time has the venting in another chamber, the Examiner disagrees. Khan gives a detailed description of the multiple tasks performed by Khan's controller 500, Figure 5A (column 25, line 40 – column 33) including the coordination of standard operating procedures of

plural process chambers 200, 300 and plural pumps 420. Among the detailed description discussed by Khan is his discussion of how his plural pumps interface with the numerous hermetic chambers employed during wafer processing (Khan column 24, lines 23-30):

"

Pumps 420 typically include pumps of varying capacity to facilitate *controlled pressure environments* within process, auxiliary and transfer chambers and loadlocks of processing system 400. Pumps 420 operate under the control of system controlled 500. Pumping connection 421 is illustrated as a single line for clarity and is intended to represent suitable piping, wiring, and pneumatic connections between pumps 420 and the various components of mainframe 405.

"

Khan column 31, lines 5-27:

"

The pressure and exhaust control task 563 includes program code for controlling the pressure in the chamber volume 204 *by regulating the size of the opening of the throttle valve 262* in chamber exhaust system 260 *and the speed of pumps 420.* The size of the opening of the throttle valve 262 is set to control the chamber pressure to the desired level *in relation to the total process gas flow, size of the process chamber, and pumping setpoint pressure for the exhaust system 260.* When the pressure and exhaust control task 563 is invoked, the desired, or target, pressure level is received as a parameter from the HDP chamber manager 560. The pressure and exhaust control task 563 operates to measure the pressure in the chamber volume 204 by reading one or more conventional pressure manometers connected to the chamber, compare the measured value to the target pressure, obtain PID (proportional, integral, and differential) values from a

stored pressure table corresponding to the target pressure, and adjust the throttle valve 262 according to the PID values obtained from the pressure table. Alternatively, the pressure and exhaust control task 563 can be written to open or close the throttle valve 562 to a particular opening size to regulate the chamber volume 204 to the desired pressure.

"

The above statements by Khan, and the disclosures of Khan and Cox as a whole, demonstrate that operations for controlling plural processing chambers for serial or parallel processing as shown by both Khan and Cox are well within the *level of ordinary skill in the art* . Specifically, Applicant's evidence appendix summarizes the differences between Cox's Figure 15 single pump operation and Applicant's single pump operation – "preferred embodiment of operation". The only difference between Cox's Figure 15 and the claimed controller, with respect to chamber 1 as shown by the time line, is a downtime in chamber 1 of applicant's invention between loading and pump down steps. Chamber 1 of Cox shows no down time in his chamber 1 operations. The only difference between Cox's Figure 15 and the claimed controller, with respect to chamber 2 as shown by the time line, is that Cox's chamber 2 has a downtime between processing and venting while Applicant's chamber 2 operations are continuous. In response to Applicant's stated differences, Applicant affirms that "The zero overhead process taught in the Cox patents is more time-efficient than the claimed operation sequence..." (last paragraph, page 12). In other words, Cox's disclosure *alone* teaches superior operating sequences over Applicant's claimed controller. Further, Applicant arrives at the claimed differences by opening and closing Applicant's valves 70 and 72, Figure 2A. Such a valve controlling sequence would be considered routine experimentation of the identical apparatus parts as shown by Cox's Figure

15 (see Examiner's rejection). Along with the teachings of pumping control by Khan (see above), the Examiner believes that such a combination would form a template for routine experimentation that would yield Applicant's claimed sequences. Similarly, on the sole basis of the Cox patent, Applicant's above statements, and the well established pillar of "routine experimentation" (MPEP 2144.05), the Examiner believes that Cox necessarily *arrived* at his most efficient operation, as conceded by Applicant, by consideration of, or through experimental trial and error of, Applicant's own claimed control sequences. As is also known even embodiments that teach away from the claimed invention, should be considered for its teachings as a whole. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Finally, Applicant states (Page 13) that the claimed invention achieves the following advantages over the prior art:

"

In contrast, the claimed invention sacrifices temporal efficiency to gain the combined advantages of (1) a reduction in the number of pumps, and (2) process pumping during the entirety of each chamber's processing phase. See Specification, ¶ [0022] - [0024]; Figs. 3 and 4. Thus, the general motivations for process automation and operation optimization would not have led the skilled artisan to adopt the operational sequence of the claimed invention, in which (1) one chamber undergoes the steps of pump down and subsequent process pumping while another chamber simultaneously undergoes the steps of venting, workpiece removal, and workpiece

reloading; and (2) the pump down pumping in one chamber begins at substantially the same time as the venting in the other chamber.

"

In response, the Examiner notes that the purported achievement of "a reduction in the number of pumps" in favor of the claimed invention is an advantage already recognized by Cox's single pump operations. On Applicant's second point that process pumping is conducted during the entirety of each chamber's processing phase also a concept already exhibited by Cox according to Applicant's own evidence appendix showing that Cox's Figure 15 supports simultaneous pump down on one chamber while there is also processing in the other chamber. Likewise, Khan also supports such a alternating pumping sequence according to Khan's "pressure and exhaust control task 563 can be written to open or close the throttle valve 562 to a particular opening size to regulate the chamber volume 204 to the desired pressure" (column 31, lines 26-27).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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